

U.S. Fish and Wildlife Service

Final Recovery Plan for Neosho Mucket (*Lampsilis rafinesqueana*)



Prepared by:
The Neosho Mucket Recovery Team

For:
Southeast Region
U.S. Fish and Wildlife Service
Atlanta, Georgia

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DISCLAIMER

Recovery plans delineate reasonable actions that are believed necessary to recover and/or protect the species. Plans are prepared by the U.S. Fish and Wildlife Service (Service), sometimes with the assistance of recovery teams, contractors, State agencies, and others. Plans are reviewed by the public and subject to additional peer review before they are adopted by the Service. Objectives will only be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Recovery plans do not obligate other parties to undertake specific tasks. Recovery plans do not necessarily represent the views nor the official positions or approval of any individuals or agencies involved in the plan formulation, other than the Service. They represent the official position of the Service only after they have been signed by the Regional Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks. By approving this document, the Regional Director certifies that the information used in its development represents the best scientific and commercial data available at the time it was written. Copies of all documents reviewed in development of the plan are available in the administrative record, located at the Service's Arkansas Field Office, Conway, Arkansas.

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This recovery plan describes criteria for determining when the Neosho Mucket should be considered for delisting. It also lists site-specific actions necessary to meet those criteria, and estimates the time required and cost for implementing recovery actions to get to recovery. Additionally, cursory information on the species biology and status are included with a brief discussion of factors limiting its populations. A Species Biological Report, which provides a more detailed accounting of the species status, biology, and threats, and a Recovery Implementation Strategy, which describes the activities to implement the recovery actions are available at <http://www.fws.gov/arkansas-es/>. The Recovery Implementation Strategy and Species Biological Report are finalized separately from the Recovery Plan and will be updated on a routine basis.

Current Species Status: The Neosho Mucket, a freshwater mussel, was listed as endangered on September 17, 2013 (78 *Federal Register* 57076). Critical habitat was designated on April 30, 2015 (80 *Federal Register* 24691). Neosho Mucket historically occurred in at least 17 streams within the Illinois, Neosho, and Verdigris River basins covering four states (Arkansas, Kansas, Oklahoma, and Missouri). Based on historical and current data, Neosho Mucket has been extirpated from approximately 1,342 km (834 mi) of its historical range (62 percent). Extant populations are disjunct (not contiguous) in approximately 819 km (509 mi). The Spring River supports the only viable Neosho Mucket population range wide.

Habitat Requirements and Limiting Factors: Little is known about habitat requirements of the Neosho Mucket. Neosho Mucket is associated with shallow riffles and runs comprised of gravel substrate and moderate to swift currents. The species is most often found in areas with swift current, but in Shoal Creek and the Illinois River it prefers near-shore areas or areas out of the main current. Threats to Neosho Mucket include curtailment of habitat and range, small population sizes, and their resulting vulnerability to natural or human induced events such as impoundments, sedimentation, chemical contaminants, mining, invasive species, and temperature. Mechanisms leading to the decline of Neosho Mucket range from local (e.g., riparian clearing, chemical contaminants, etc.) to regional influences (e.g., altered flow regimes, sedimentation, channelization, etc.), and global climate change. These factors may act in isolation, but it is probable that many stressors are acting simultaneously on Neosho Mucket populations.

Recovery Strategy: The primary strategy for recovery of Neosho Mucket is to conserve the range of genetic and morphological diversity of the species across its historical range; fully quantify population demographics and status within each river; improve population size and viability within each river; reduce threats adversely affecting the species within each river (e.g., habitat degradation from sedimentation, chemical contaminants, channel destabilization, water diversion); emphasize voluntary soil and water stewardship practices by citizens living and working within each watershed; and to prevent local extirpation where recruitment failure is occurring and for reintroduction within rivers historically occupied by Neosho Mucket. Neosho Mucket recovery will require an increased understanding of the species status throughout its range; developing information on life history, ecology, mortality, and habitat requirements; improving our understanding of some poorly understood threats potentially affecting the species; and using this information to implement management actions to promote recovery. This recovery

strategy increases the species representation, resiliency and redundancy to ensure populations persist over time in the wild.

Conservation and recovery of the species will require human intervention for the foreseeable future. Human activities, population numbers, and associated adverse effects will change within watersheds, particularly those associated with urban sprawl and energy development. Therefore, it is essential to characterize and monitor aquatic habitats on a watershed scale, and rapidly respond to changing conditions, whether through negotiation and partnerships to alleviate threats, or through husbandry and augmentation and/or reintroduction of individuals in appropriate areas. This approach will require monitoring extant populations and characterizing current habitat conditions in each river.

Recovery Goal: The goal of this Neosho Mucket Recovery Plan is to stop the decline and enhance Neosho Mucket populations to prevent extinction and support delisting from the *List of Endangered and Threatened Wildlife*. To achieve this goal it will be necessary to establish naturally self-sustaining populations with healthy long-term demographic traits and trends.

Recovery Criteria (delisting):

- (1) Two of four targeted river basins (Illinois, Verdigris, Neosho, and Spring River basins) contain viable populations¹ with positive or stable basin-wide population trend as evidenced by a population number measured with sufficient precision to detect change of ± 25 percent (Factors A, D, and E).
- (2) Spatial distribution of natural or stocked aggregations distributed throughout the basin is sufficient to protect against local catastrophic or stochastic events (Factors A and E).
- (3) All life stages are supported by sufficient habitat quantity and quality (see Primary Constituent Elements in *Species Biological Report for Neosho Mucket*) and appropriate presence and abundance of fish hosts necessary for recruitment (Factors A, D, and E).
- (4) Threats and causes of decline have been reduced or eliminated (Factors A, D, and E).

Actions Needed: The recovery actions identified below are those that, based on the best available science, we believe are necessary to bring about the recovery of the Neosho Mucket. We have included an estimated cost to complete the action and priority number².

¹ A viable population is defined as a wild, naturally reproducing population that is able to persist and maintain sufficient genetic variation to evolve and respond to natural changes and stochastic events without further human intervention. Viable populations are expected to be large and genetically diverse, include at least five age classes with at least one cohort ≤ 7 years of age, and recruit at sufficient rates to maintain or increase population size.

² Recovery actions are assigned numerical priorities to highlight the relative contribution they may make toward species recovery (48 FR 43098):

Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

Priority 3 - All other actions necessary to provide for full recovery of the species.

Recovery Action	Estimated Cost	Priority
1. Establish viable populations within two of four targeted river basins (Illinois, Verdigris, Neosho, and Spring River basins) Illinois, Spring, Verdigris, and Neosho river basins	\$1,755,000	1
2. Develop and implement a monitoring protocol for the Neosho Mucket	\$900,000	3
3. Identify, prioritize and conduct research to enhance the conservation and recovery of Neosho Mucket	\$1,082,000	2
4. Watershed and habitat improvement and protection ¹	\$4,500,000	1
5. Enhance the level of protection through policy, regulation, and enforcement	\$1,255,000	2
6. Develop and implement strategies to prevent the spread of competitive, nonindigenous (nonnative) species	\$300,000	3
7. Periodically review recovery progress and strategy.	-	3
Total Estimated Cost: \$9,792,000		

¹Planning costs for Activities 4.1 and 4.8 split evenly across years (175K/5 year period).

Date of Recovery: If all actions are fully funded and implemented as outlined, including full cooperation of all partners needed to achieve recovery, we anticipate delisting could be achieved by 2049.

Estimated Cost of Delisting: The estimated costs associated with implementing recovery actions for delisting are \$9,792,000. Cost estimates reflect costs for specific actions needed to achieve Neosho Mucket recovery. Some costs for recovery actions are not determinable at this time; therefore, the total cost for recovery may be higher than this estimate.

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